

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1 (withdrawn): A method for producing a light emitting diode, which has a plated substrate with a mirror, comprising steps of:

- a) providing a substrate with an LED epitaxial structure including a second cladding layer, an active layer, a first cladding layer, a window and a metal contact layer sequentially formed on said substrate;
- b) etching a part of said LED epitaxial structure to expose said second cladding layer;
- c) forming a first electrode and a second electrode respectively on said metal contact layer and said exposed second cladding layer, and heating both said electrodes by rapid thermal annealing;
- d) bonding a temporary substrate to said LED epitaxial structure and said first electrode;
- e) removing said substrate provided in step a);
- f) forming a mirror beneath said LED epitaxial structure;
- g) plating a permanent substrate beneath said mirror; and
- h) removing said temporary substrate.

Claim 2 (withdrawn): The method as claimed in claim 1, wherein said substrate provided in step a) is a GaAs substrate, a sapphire substrate or an InP substrate.

Claim 3 (withdrawn): The method as claimed in claim 1, wherein said LED epitaxial structure is made from a material selected from the group

consisting of $\text{Ga}_x\text{Al}_y\text{In}_{1-x-y}\text{N}$, $(\text{Al}_x\text{Ga}_{1-x})_y\text{In}_{1-y}\text{P}$, $\text{In}_x\text{Ga}_{1-x}\text{As}$, $\text{ZnS}_x\text{Se}_{1-x}$;
wherein $0 \leq x \leq 1$, $0 \leq y \leq 1$.

Claim 4 (withdrawn): The method as claimed in claim 1, wherein said metal contact layer is partially etched to retain a portion beneath said first electrode.

Claim 5 (withdrawn): The method as claimed in claim 1 further depositing a transparent conductive film between said first electrode and said metal contact layer.

Claim 6 (withdrawn): The method as claimed in claim 1, wherein said temporary substrate is a glass substrate.

Claim 7 (withdrawn): The method as claimed in claim 1, wherein said temporary substrate is bonded to said LED epitaxial structure with epoxy or wax.

Claim 8 (withdrawn): The method as claimed in claim 1, wherein said mirror is a metal capable of forming high bandgap with said LED epitaxial structure.

Claim 9 (withdrawn): The method as claimed in claim 8, wherein said mirror is made from a material selected from the group consisting of Ag, Pt, Pd, Au, Au/Zn, Au/Be, Au/Ge, Au/Ge/Ni, In, Sn, Al, Zn, Ge and Ni, or mixtures thereof.

Claim 10 (withdrawn): The method as claimed in claim 1, wherein said mirror is made from a composite of a metal with a low refractivity and an insulating layer with a high refractivity, and said insulating layer is adjacent to said LED epitaxial structure.

Claim 11 (withdrawn): The method as claimed in claim 10, wherein said composite is selected from the group consisting of $\text{Al}/\text{Al}_2\text{O}_3$,

Al/SiO_2 , Al/MgF_2 , $\text{Pt}/\text{Al}_2\text{O}_3$, Pt/SiO_2 , Pt/MgF_2 , $\text{Al}/\text{Al}_2\text{O}_3$, Al/SiO_2 , Al/MgF_2 , $\text{Au}/\text{Al}_2\text{O}_3$, Au/SiO_2 , Au/MgF_2 , $\text{Ag}/\text{Al}_2\text{O}_3$, Ag/SiO_2 , Ag/MgF_2 .

Claim 12 (withdrawn): The method as claimed in claim 1, wherein said permanent substrate is plated beneath said mirror other than predetermined saw streets.

Claim 13 (currently amended): A light emitting diode having a plated substrate with a mirror, comprising:

an LED epitaxial structure sequentially comprising a second cladding layer, an active layer, a first cladding layer, a window and a metal contact layer, wherein said second cladding layer is partially exposed, ~~wherein said active layer is made from a material selected from the group consisting of $(\text{Al}_x\text{Ga}_{1-x})_y\text{In}_{1-y}\text{P}$, $\text{Ga}_x\text{Al}_y\text{In}_{1-x-y}\text{N}$, $\text{In}_x\text{Ga}_{1-x}\text{As}$, and $\text{ZnS}_x\text{Se}_{1-x}$, $0 \leq x \leq 1$, $0 \leq y \leq 1$;~~

a first electrode formed on said metal contact layer;

a second electrode formed on said exposed second cladding layer;

a mirror formed beneath said LED epitaxial structure; and

a ~~permanent metal~~ copper substrate plated beneath said mirror and retaining sawing streets without plating the substrate thereon;

wherein said mirror is made from a composite, ~~a metal or an alloy of a metal layer with low refractivity and an insulating layer with high refractivity,~~ adjacent to the LED epitaxial structure, selected from the group consisting of:

Al/MgF_2 , $\text{Pt/Al}_2\text{O}_3$, Pt/SiO_2 , Pt/MgF_2 , Au/SiO_2 , Au/MgF_2 , Ag/MgF_2 ;

~~Ag , Au , Au/Zn , Au/Be , Au/Ge , Au/Ge/Ni and Zn , or mixtures thereof~~
~~when said active layer is made from $(\text{Al}_x\text{Ga}_{1-x})_y\text{In}_{1-y}\text{P}$;~~

~~Ag , Pt , Pd , Al , and Ni , or mixtures thereof~~ when said active layer is made from $\text{Ga}_x\text{Al}_y\text{In}_{1-x-y}\text{N}$, $0 \leq x \leq 1$, $0 \leq y \leq 1$;

~~Ag , Au , Au/Zn , Au/Be , Au/Ge , Au/Ge/Ni and Zn , or mixtures thereof~~
~~when said active layer is made from $\text{In}_x\text{Ga}_{1-x}\text{As}$, $0 \leq x \leq 1$, $0 \leq y \leq 1$; or~~

~~Ag , Pt , Pd , Au/Zn , Au/Be , Au/Ge , Au/Ge/Ni , Al and Ni , or mixtures thereof~~ when said active layer is made from $\text{ZnS}_x\text{Se}_{1-x}$, $0 \leq x \leq 1$, $0 \leq y \leq 1$.

Claim 14 (canceled)

Claim 15 (original): The light emitting diode as claimed in claim 13 further comprising a transparent conductive film between said first electrode and said metal contact layer.

Claims 16-25 (canceled)

Claim 26 (new): The light emitting diode as claimed in claim 13, wherein the copper substrate is an electroless copper substrate with 30 μ m thick.

Claim 27 (new): The light emitting diode as claimed in claim 13 further comprising a film of Pd, coated beneath the metal layer of the mirror, to accelerate the reaction of electroless copper substrate.

Claim 28 (new): The light emitting diode as claimed in claim 13, wherein said metal contact layer remains only the portion beneath the first electrode.

Claim 29 (new): A light emitting diode having a plated substrate with a mirror, comprising:

an LED epitaxial structure sequentially comprising a second cladding layer, an active layer, a first cladding layer, a window and a metal contact layer, wherein said second cladding layer is partially exposed;

a first electrode formed on said metal contact layer;

a second electrode formed on said exposed second cladding layer;

a mirror formed beneath said LED epitaxial structure; and

a copper substrate plated beneath said mirror and retaining sawing streets without plating the substrate thereon;

wherein said metal contact layer remains only the portion beneath the first electrode;

wherein said mirror is made from a composite of a metal layer with low refractivity and an insulating layer with high refractivity, adjacent to said LED epitaxial structure, selected from the group consisting of:

Al/MgF₂, Pt/Al₂O₃, Pt/SiO₂, Pt/MgF₂, Au/SiO₂, Au/MgF₂, Ag/MgF₂.

Claim 30 (new): The light emitting diode as claimed in claim 29, wherein said

copper substrate is formed by using electroless plating.

Claim 31 (new): The light emitting diode as claimed in claim 29, wherein said copper substrate is about 30 μ m thick.

Claim 32 (new): The light emitting diode as claimed in claim 29 further comprising a transparent conductive film between said first electrode and said metal contact layer.

Claim 33 (new): The light emitting diode as claimed in claim 30 further comprising a film of Pd, coated beneath the metal layer of the mirror, to accelerate the reaction of electroless copper substrate.

Claim 34 (new): A light emitting diode having a plated substrate with a mirror, comprising:

an LED epitaxial structure sequentially comprising a second cladding layer, an active layer, a first cladding layer, a window and a metal contact layer, wherein said second cladding layer is partially exposed;

a first electrode formed on said metal contact layer;

a second electrode formed on said exposed second cladding layer;

a mirror formed beneath said LED epitaxial structure; and

an electroless copper substrate plated beneath said mirror and retaining sawing streets without plating the substrate thereon;

wherein said metal contact layer remains only the portion beneath the first electrode;

wherein the light emitting diode further comprising a film of Pd, coated beneath the metal layer of the mirror, to accelerate the reaction of electroless copper substrate.

Claim 35 (new): The light emitting diode as claimed in claim 34, wherein said electroless copper substrate is about 30 μ m thick.

Claim 36(new): The light emitting diode as claimed in claim 34, further comprising a transparent conductive film between said first electrode and said metal

contact layer.

Claim 37 (new): The light emitting diode as claimed in claim 34, wherein said metal contact layer remains only the portion beneath the first electrode.

Claim 38 (new): The light emitting diode as claimed in claim 34, wherein said mirror is made from a composite of a metal layer with low refractivity and an insulating layer with high refractivity selected from the group consisting of:

Al/MgF₂, Pt/Al₂O₃, Pt/SiO₂, Pt/MgF₂, Au/SiO₂, Au/MgF₂, Ag/MgF₂.

Claim 39 (new): The light emitting diode as claimed in claim 38, wherein said composite of a metal layer with low refractivity and an insulating layer with high refractivity is Au/SiO₂.